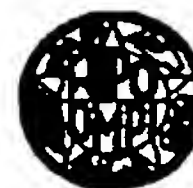


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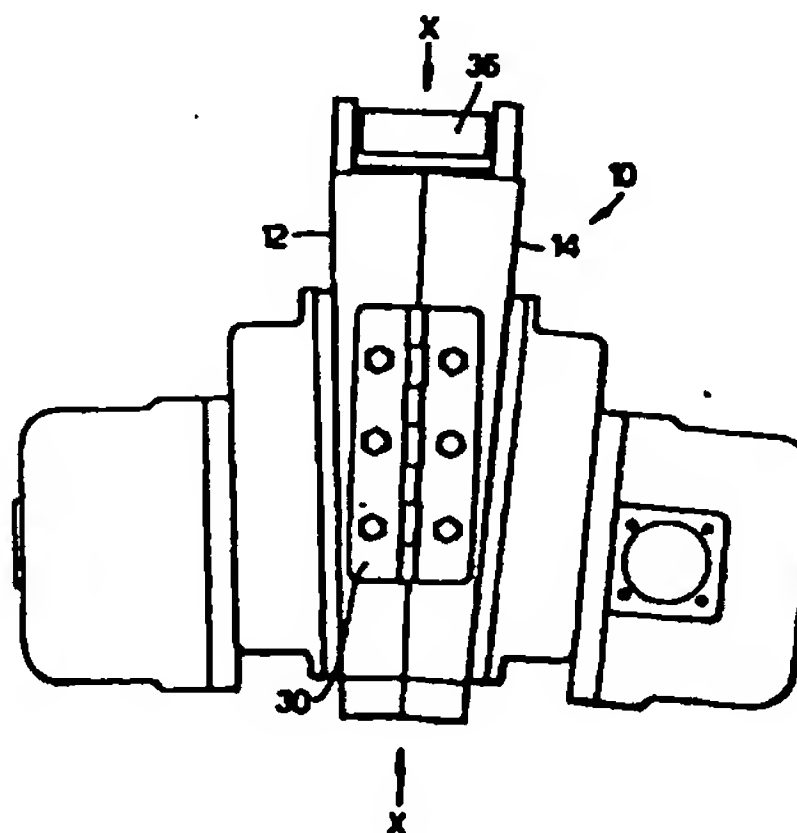
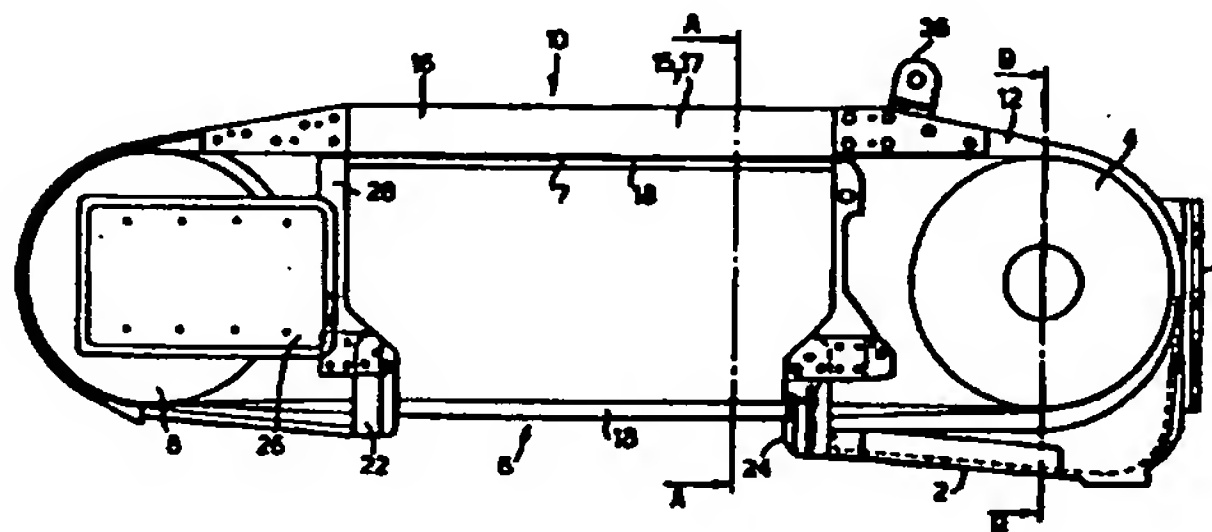
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(54) Title: APPARATUS FOR REMOVING SPINAL COLUMN MATERIAL

(57) Abstract

There is described a saw for removing spinal column material from cattle carcasses in order to avoid exposing spinal column material, thereby avoiding such material coming into contact with the saw, the operator or the meat, thereby eliminating any possibility of the spread of Bovine Spongiform Encephalopathy (BSE) by contact with such material. The saw comprises a housing (10) comprising a first and a second part (12, 14), each including one of a pair of bandsaw frames (15, 17) that are arranged in a generally mutually parallel spaced-apart relationship. Each frame (15, 17) carries a looped bandsaw blade having a cutting section 6. The apparatus can be moved along the length of a carcass to cause the blades simultaneously to cut the carcass either side of the spinal column into three longitudinal portions comprising an inner portion containing spinal column material and two outer portions containing substantially no spinal column material. The saw also has at least one connector (e.g. a hinge 30 and a pneumatic cylinder 36) for holding the housing parts (12, 14) firmly with respect to each other in such a way that the saw blades in the cutting sections (6) are spaced apart by a predetermined gap (38); the connectors are releasable to allow the housing parts (12, 14) to be moved outwardly relative to each other, which is desirable to permit the saw to be separated from a carcass and to simplify the changing of the bandsaw blades.



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## **Apparatus for Removing Spinal Column Material**

### **Technical Field**

The present invention relates to an apparatus for removal of spinal column material from a carcass, particularly of cattle, sheep and goats but the invention is also applicable to the carcasses of other animals, for example deer.

### **Background Art**

The spinal cord of any animal is considered to be a source of contamination and, with the advent of Bovine Spongiform Encephalopathy (BSE), the spinal cord of cattle is now classified in the United Kingdom as "Specified Bovine Material" which means that it requires special handling and disposal procedures.

Current slaughterhouse procedures for cattle involves splitting carcasses into halves through the spinal column using a bandsaw and disposing of the spinal cord as Specified Bovine Material. This, however, brings the saw into contact with the spinal cord, which could result in the contamination of the bandsaw, the meat and the slaughterhouse operatives.

The problem underlying the present invention is to find an improved way of butchering carcasses that simplifies the handling of animal parts containing the spinal cord and also reduces the risk that contaminated spinal cords will come into contact either with meat fed into the food chain or with the slaughterhouse operatives, thereby avoiding any possibility of the spread of Bovine Spongiform Encephalopathy by contact with such material. The present invention achieves the above object by an apparatus that is relatively straightforward to use and does not involve substantial additional time in carcass dressing.

The use of bandsaws has been well known in the industry for cutting or splitting carcasses into halves; such saws are extremely heavy to manipulate and must generally be suspended by a support, e.g. a counterbalanced pulley system, to enable them to be used. An example of such a bandsaw is disclosed in EP-A-0 126 912.

US-A-4 146 945 describes a method of splitting two carcasses simultaneously by supporting the carcasses side-by-side. A single band saw blade passes around a four-sided frame that can be moved vertically. The two carcasses are placed under two sides of the frame so that they are split simultaneously by different parts of the band as it is moved vertically down on the carcasses.

GB-A-1 108 334 describes a double knife mechanism for back-bone chining (removing the backbone) of pigs for bacon production. The pigs are held in a frame during this operation; twin knives are caused to reciprocate by a motor. The knives are mounted on a bridge between columns and the bridge is moved down the columns to divide the carcass into three sections, two outer sections and a central section containing the backbone. However, such an arrangement is only suitable for pigs and not for cattle (which are the species causing concern Bovine Spongiform Encephalopathy (BSE)) since cattle bones are too hard and would splinter under the motion of the knives. Furthermore, backbone chining is limited to pigs where it is used solely for the production of bacon.

#### Disclosure of the Invention

According to the present invention, there is provided an apparatus for removing spinal column material from a carcass, comprising a pair of bandsaw blades mounted on a common housing, wherein the housing holds the blades in a generally parallel spaced-apart relationship whereby the apparatus can be moved along the length of a carcass to cause the blades simultaneously to cut the carcass into three longitudinal portions comprising an inner portion containing spinal column material and two outer portions containing substantially no spinal column material.

According to another aspect of the present invention, there is provided an apparatus for removing spinal column material from a carcass, comprising:

- a housing comprising a first and a second part;

- a pair of bandsaw blades mounted respectively on the first and the second housing parts and having cutting sections that are in a generally mutually parallel spaced-apart relationship, whereby the apparatus can be moved along the length of a carcass to cause the cutting sections of the blades simultaneously to cut the carcass into three longitudinal

portions comprising an inner portion containing spinal column material and two outer portions containing substantially no spinal column material;  
at least one motor for circulating the bandsaw blades;  
at least one connector for releasably holding the first and the second housing parts firmly with respect to each other in such a way that the saw blades in the cutting sections are spaced apart by a predetermined gap, said at least one connector being releasable to allow the housing parts to be moved relative to each other to alter the spacing between the blades.

The two parts of the housing are preferably connected by a hinge allowing the two housing parts to pivot outwardly to alter the spacing between the blades and a detent for holding the housing parts together to prevent them pivoting about the said hinge, said detent being releasable to allow the housing parts to be moved relative to each other to alter the spacing between the blades. However other means may be used for releasably ganging the first and the second housing parts together, while allowing, when desired, the two parts to be moved apart, e.g. to release the blades from a carcass or to replace the bandsaw blades.

The first and second housing parts holding the bandsaw blades are preferably arranged in a "V" shaped configuration.

The prior art contains no proposal to make a twin-bladed bandsaw and indeed it would generally have been considered that a twin-bladed band saw would be completely impractical because it would be so very heavy that, despite a counterbalancing support arrangement, such a saw would be extremely difficult (if not impossible) to manoeuvre with accuracy. The present invention is at least partly based on the realisation that such a prejudiced view is in fact wrong and it is possible to manoeuvre a double bandsaw and indeed such a saw is surprisingly good at removing a relatively narrow central section containing the spinal column material without also removing valuable meat on either side of the spinal column.

Although the two bandsaw blades may be driven by a single common drive, such an arrangement will generally be asymmetrical and will render the saw difficult to handle. Therefore it is

preferred that (despite the additional weight) separate drive motors are used to drive the bandsaw blades. In this way the two housing parts can be symmetrical about a central plane.

The present invention also provides a method of simultaneously cutting a carcass into three longitudinal portions comprising an inner portion containing spinal column material and two outer portions containing substantially no spinal column material, the method comprising passing the apparatus as defined in the immediately preceding paragraphs along the length of a carcass to cause the blades simultaneously to cut the carcass either side of the spinal column into the said three portions.

#### Brief Description of the Drawings

An embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a side view of a double blade bandsaw according to the present invention;

Figure 2 is a rear elevation of the bandsaw of Figure 1;

Figure 3 is sectional view of the bandsaw of Figure 1 through the line A-A (shown in Figure 1);

Figure 4 is sectional view of the bandsaw of Figure 1 through the line B-B (shown in Figure 1).

#### Best Mode for Carrying out the Invention

Referring to all the drawings, there is shown a twin-bladed saw 1 including a housing 10 consisting of two parts 12,14, each part essentially being made up by a single bandsaw. In the twin-bladed saw of the present invention, the single bandsaws are ganged together, as described below.

The twin-bladed saw of the present invention will generally be supported by a suspension system (not shown) attached to the housing parts 12,14 of the saw. Using such a system, the weight of the bandsaw is counterbalanced by a counterweight (not shown).



Each housing part 12,14 has a bandsaw frame 15,17 including a pair of tension wheels 8,9, that are spaced apart by respective top frame members 16. A pair of looped bandsaw blades 18 are mounted on the tension wheels 8,9; when passing over the wheels 8,9, the teeth of each bandsaw blade are horizontal, i.e. the band lies parallel to the edges of the wheels 8,9. Each bandsaw blade 18 has a cutting section 6 in which the bandsaw blade 18 is twisted by approximately 90° with respect to the rest of the loop so that the teeth are generally vertical and so that in the cutting sections 6, the two bandsaw blades 18 are parallel to each other and cut in a generally vertical direction. The twisting of the blades 18 is achieved by a pair of guides 22,24 secured on each housing part 12,14 just before and just after the cutting section of each blade.

The front tension wheels 8 are idle and are each held by a bearing between plates 26 (only one shown) held rigidly by cross-pieces 28 to the top frame members 16. The rear tension wheels 9 are each driven via respective gearboxes (not shown in detail but indicated by the reference numeral 3) by separate motors 4 (again not shown in detail). The motors are preferably electric but may be powered in any other way. The motors 4 cause the respective bandsaw blades 18 to circulate around the tension wheels 8 of each bandsaw frame 15,17 to bring successive parts of the blade into the cutting section 6. A grip handle 2 is provided for an operator.

The two housing parts 12,14 are rigidly joined by a rear hinge 34 and a manually operated pneumatic air cylinder 36. In normal use, the pneumatic cylinder 36 keeps the two housing parts rigidly aligned so that the bandsaw blades 18 in the cutting sections 6 are generally parallel and are spaced-apart by a gap 38 that is uniform along the length of the cutting sections 6 of the two bandsaw blades 18. However, the pneumatic cylinder can be manually released to allow the two housing parts 12,14 to pivot in an arc about the hinge 34 to a set limited angle to allow the two bandsaws to be moved apart so that they can be withdrawn at the bottom of a cut that does not completely sever the central carcass section (containing the spinal column) from the two sides of the carcass (containing the meat); this can happen particularly if slaughter house inspectors require the head to be left attached to the carcass until after inspection. Preferably, also, the pneumatic cylinder 36 will allow the housings to open more fully to facilitate easy blade replacement. Such manually operable pneumatic cylinders 36 are standard commercially available components and further description will be superfluous. It will, however, be appreciated that the

cylinder may be hydraulic and may be powered; indeed any arrangement for releasably maintaining the bandsaw blades in parallel relationship in the cutting sections 6 can be used instead of the pneumatic cylinder 36.

The width of the gap between the bandsaw blades in the cutting sections 6 (distance 38 shown in Figure 3) is generally set for each saw according to the type of animal the saw is to be used for; it is nominally set at 50mm for cattle, although other distances can be set, if desired.

To reduce any interference between the frames 16 containing the return sections 7 of the bandsaw blades 18 and the carcass, the width of the top frame sections 16 should be as narrow as possible. However, an operator must be guarded from the blade in the return sections 7, and the narrowing of the top frame 16 could lead to the blade being exposed in those return sections 7. To prevent this, the blades in the return sections 7 may also be twisted about 90° so that they lie vertically, as is the case in the cutting sections 6. This enables the width of the frame 16 to be reduced while completely covering the return sections 7 of the blade.

When viewed end on (see Figures 3 and 4), the bandsaw frames 15, 17 are mounted in a V-shape. Such an arrangement allows the top frames 16 to be spaced apart by a distance 40 greater than the distance 38 separating the bandsaw blades 18 in the cutting sections 6 and so allows the twin-bladed bandsaw 1 to be manoeuvred without the top frames 16 coming into contact with the central backbone section of the carcass and hence interfering with the operation of the saw.

The saw depicted in the Figures can be made by taking two bandsaws of the type conventionally used in the slaughterhouse industry and replacing the conventional casing around the rear tension wheel 9 (which has a vertical sidewall on the side remote from motor 4) with a casing having a sloping sidewall so that when the two bandsaws are ganged together as described above, the saws will have the "V" configuration referred to above. The guides 22,24 twisting the blades 18 before and after the cutting sections 6 will also need to be adjusted to ensure that the bandsaw blades 18 of the two saws are vertically aligned in the cutting sections 6. Such conventional single bladed bandsaws are widely used in the industry and are commercially available, e.g. from Jarvis Products Corporation of 33 Anderson Road, Middletown, Connecticut 06457, United States of



America. Since the inner workings of the individual bandsaws form no part of the present invention and are entirely conventional in nature, no more detailed description will be given since such inner working will be entirely apparent to those in the art.

It is important for the safe operation of the saw that the frame parts 15,17 (or associated casing) shield the operator from coming into contact with the revolving blades 18, although the blades will of course have to be exposed in the cutting sections 6.

In order to ensure that the carcass remains stationary during the sawing operation, a carcass is suspended conventionally by its rear legs, which are spread. The twin-bladed bandsaw 1 is then moved vertically down the length of the carcass so that one bandsaw frame 15, 17 and its associated blade 18 is on either side of the carcass' spinal column. The carcass will have been previously dressed, and so the two bandsaw frames and blades 15,17,18 are received in the internal cavity of the carcass. The weight of the saw during the cutting operation is carried by the suspension system mentioned above, thereby requiring the operator merely to apply sufficient force to move the saw vertically, and to steer the saw, if necessary. Because the saw is symmetrical about a central plane X-X (see Figure 2), the saw turns out to be relatively simple to manoeuvre.

Because the double saw directly replaces the existing single bladed splitting saw, a conventional dressing specification can be used with one minor change. An additional roller has to be introduced between the back legs at the transfer position. This is used to support the spinal column and the head until after inspection when the spine and head can be routed to the byproducts area and the carcass sides moved onto weighing and chilling.

**CLAIMS**

1. An apparatus for removing spinal column material from a carcass, comprising a pair of bandsaw blades mounted on a common housing, wherein the housing holds the blades in a generally parallel spaced-apart relationship whereby the apparatus can be moved along the length of a carcass to cause the blades simultaneously to cut the carcass into three longitudinal portions comprising an inner portion containing spinal column material and two outer portions containing substantially no spinal column material.
2. An apparatus as claimed in claim 1, wherein the housing comprises two parts, each including one of the bandsaw blades, the arrangement being such that the housing parts can be moved relative to each other to decrease or increase the gap between the blades (e.g. by pivoting the blades through an arc about a hinge), the apparatus further comprising means for releasably holding the housing parts firmly with respect to each other in such a way that the saw blades are spaced apart by a predetermined gap.
3. An apparatus for removing spinal column material from a carcass, comprising:  
a housing comprising a first and a second part;  
a pair of bandsaw blades mounted respectively on the first and the second housing parts and having cutting sections that are in a generally mutually parallel spaced-apart relationship, whereby the apparatus can be moved along the length of a carcass to cause the cutting sections of the blades simultaneously to cut the carcass into three longitudinal portions comprising an inner portion containing spinal column material and two outer portions containing substantially no spinal column material;  
at least one motor for circulating the bandsaw blades;  
at least one connector for releasably holding the first and the second housing parts firmly with respect to each other in such a way that the saw blades in the cutting sections are spaced apart by a predetermined gap, said at least one connector being releasable to allow the housing parts to be moved relative to each other to alter the spacing between the blades.

4. The apparatus of claim 3, wherein the said at least one connector comprises:  
a hinge holding the two housing parts together in such a way that the housing parts can pivot outwardly to increase the spacing between the blades; and  
a detent for holding the housing parts together to prevent them pivoting about the said hinge, said detent being releasable to allow the housing parts to be moved relative to each other to alter the spacing between the blades.
5. The apparatus of any one of claims 2 to 4, wherein the first and second housing parts holding the blades are arranged in a "V"-shaped configuration.
6. The apparatus of any one of claims 1 to 5, wherein each bandsaw blade is driven by a separate drive motor.
7. The apparatus of any one of claims 1 to 6, wherein the first and second housing parts are symmetric about a central plane.
8. A method of simultaneously cutting a carcass into three longitudinal portions comprising an inner portion containing spinal column material and two outer portions containing substantially no spinal column material, the method comprising passing the apparatus as claimed in any one of claims 1 to 7 along the length of a carcass to cause the blades simultaneously to cut the carcass either side of the spinal column into the said three portions.

Fig.1.

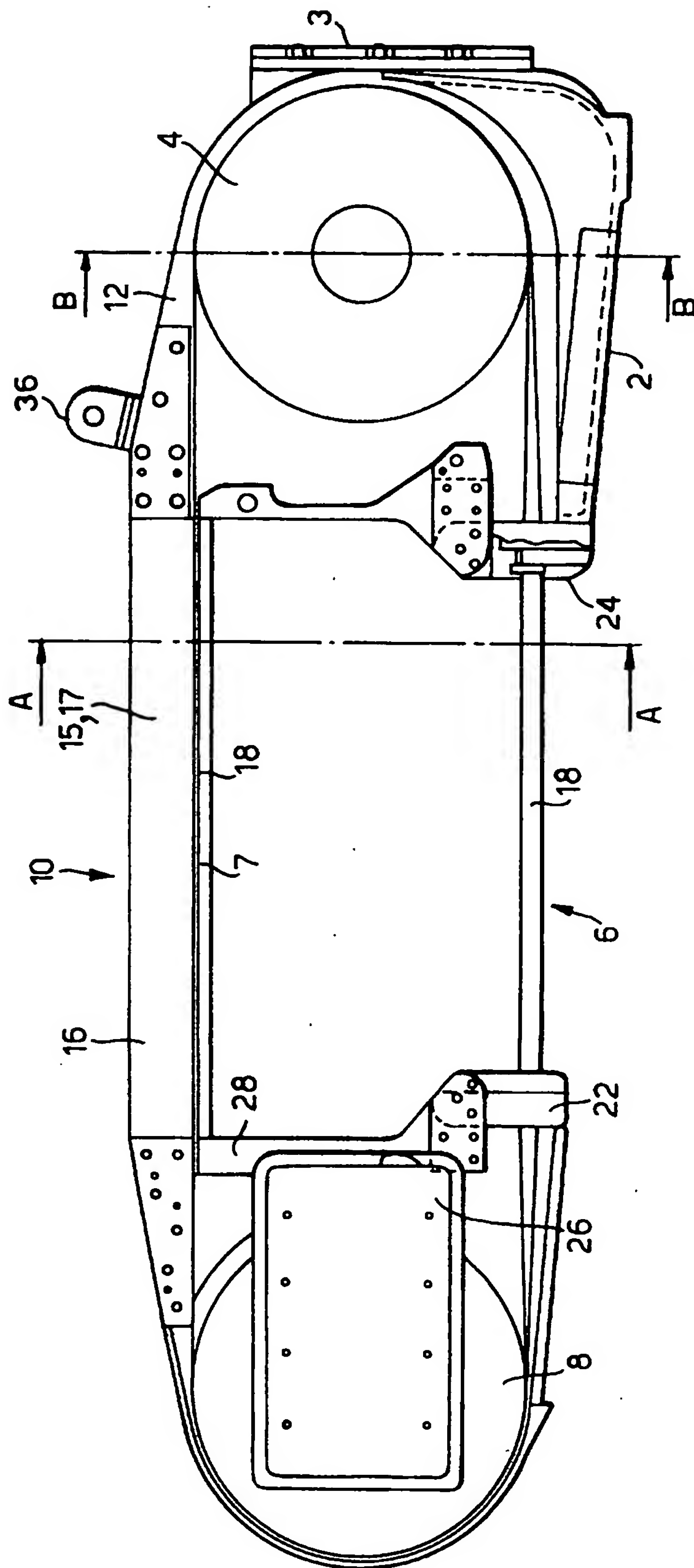


Fig.2.

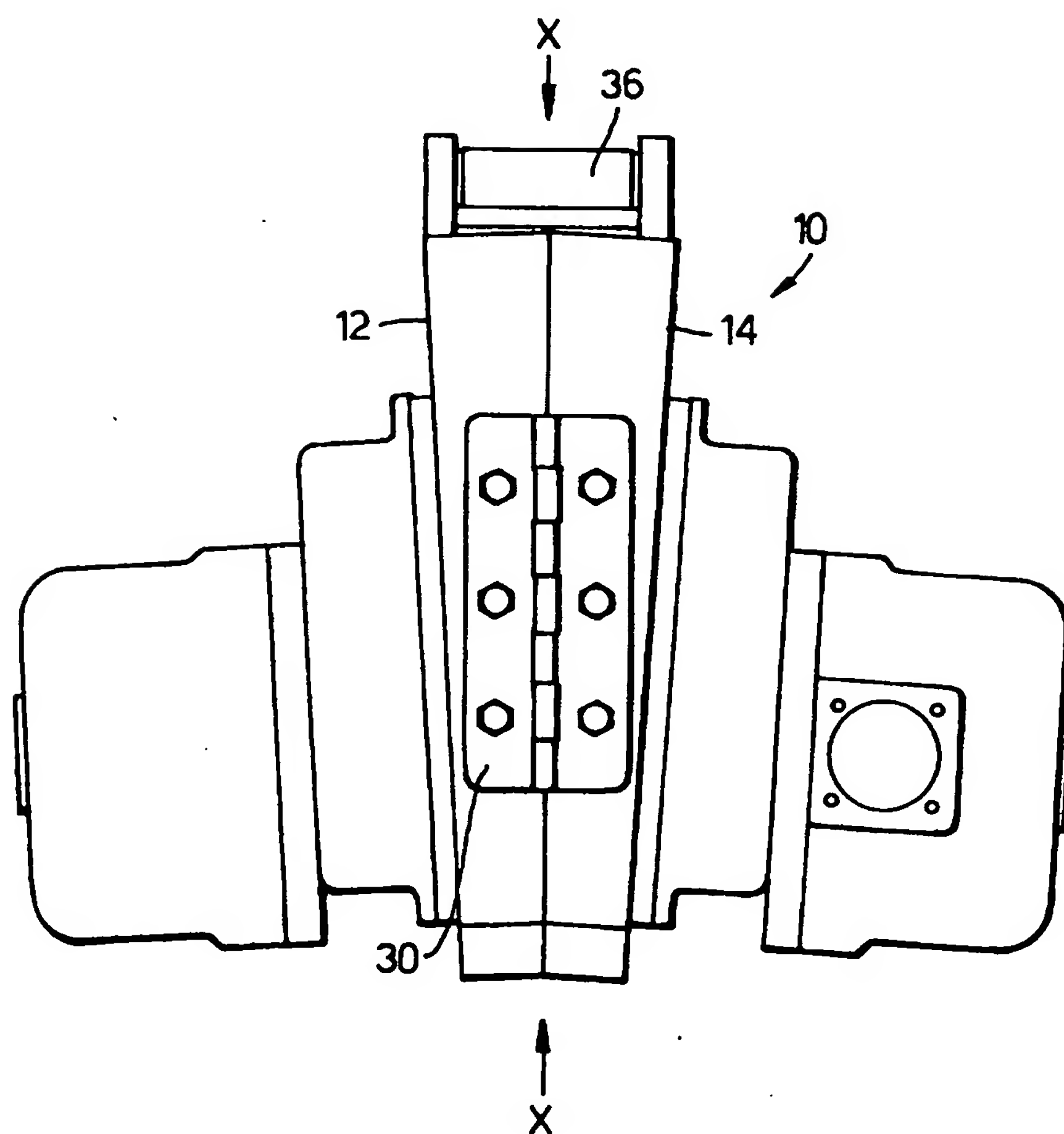




Fig.3.

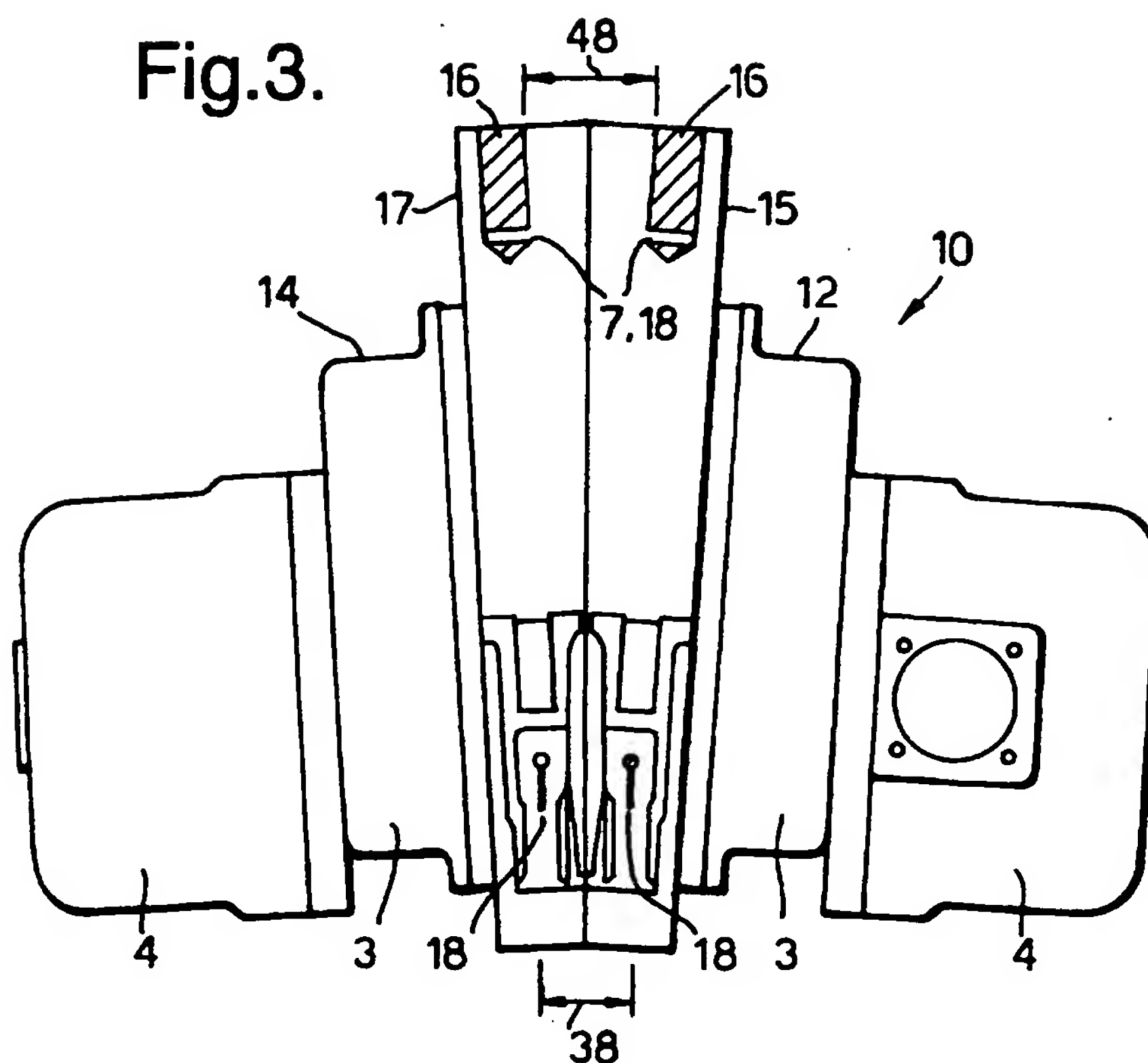
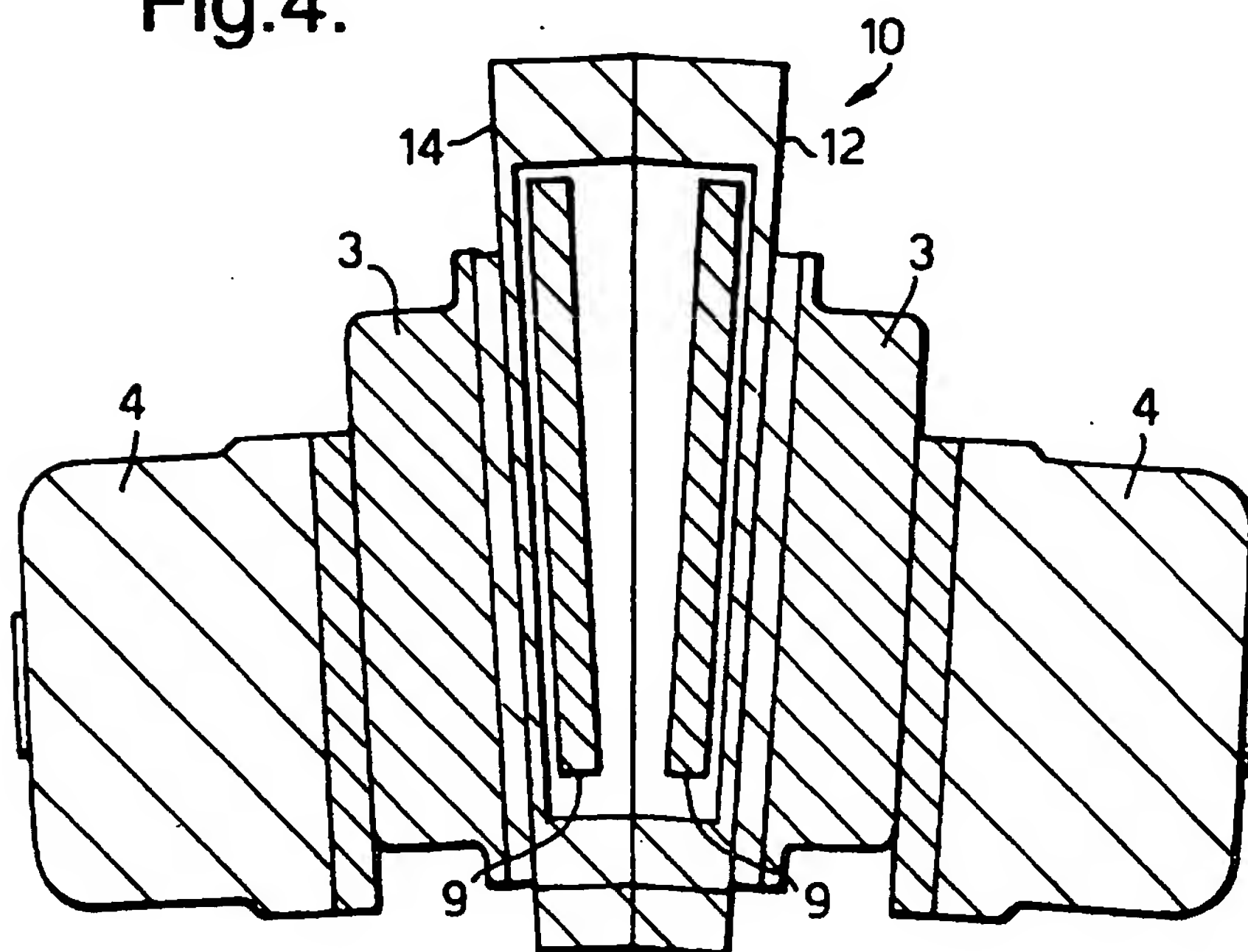


Fig.4.



# INTERNATIONAL SEARCH REPORT

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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NL 279 923 A (FREUCHEN) 25 November 1964 see the whole document	1-8
A	SE 336 542 A (EKSTAM) 5 July 1971 see the whole document	1-8
A	US 3 995 350 A (EKSTAM) 7 December 1976	

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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SE 336542 A	05-07-71	NONE	
US 3995350 A	07-12-76	US B519599 I	17-02-76

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